

[stamp] Petitioned

Unexamined Patent Application Bulletin

(19) Japan Patent Office (JP)

(11) Unexamined Patent Application
Bulletin No.

S51-90077

(43) Publication Date:

August 6, 1976

(21) Application Number:

S50-16080

(22) Date of Application:

February 6, 1975

Request for Examination:

Made

Total of 5 Pages

Internal Reference Numbers

7033 51

(52) Japanese Classification

72 C54

(51) Int.Cl.²

B03C 3/48

[revenue stamp] ¥2,000

Patent Application

February 6, 1975

Commissioner of Japan Patent Office:

Hideo SAITO

1. Title of the Invention:

Air sterilization and purification apparatus

2. Inventor:

Kiyoshi ANZAI

Domicile:

1070-2 Kataoka, Hiratsuka-shi, Kanagawa-ken

3. Applicant:

Director: Kiyoshi ANZAI

Domicile:

Kyowa Seiko, Ltd.

1070-2 Kataoka, Hiratsuka-shi, Kanagawa-ken

4. Agent:

Hiraki MIURA (4002) Patent Attorney [seal]

Domicile:

Marukin Building, Kagurazaka, Shinjuku-ku Tokyo 162

5. List of Appended Documents

(1) Specification

1 set

(2) Drawings

1 set

(3) Duplicate Copy of Application

1 set

(4) Power of Attorney

1 set Method Examination

(5) Request for Examination

1 set

[illegible stamp]

Specification

1. Name of the Invention: Air Sterilization and Purification Apparatus

2. Scope of Patent Claims

In an air purification apparatus that passes positively charged airborne dust between opposing electrodes, an air sterilization and purification apparatus wherein air is caused to pass through while inducing a separation phenomenon by switching the direction of flow of air that passes through the aforementioned opposing electrodes and modifying a cross section of the passage.

3. Detailed Description of the Invention

The invention of the present application is one that relates to an air sterilization and purification apparatus, and in a purification device that causes airborne dust particles to be absorbed by static electricity, relates to a device capable of raising dust removal effectiveness, and is intended to achieve an air sterilization and purification apparatus that, in particular, is made up of a combination of novel and ever simpler elements, is manufactured by a simple process with lower costs of production, and that, with excellent safety, is capable of achieving even better results in use.

Along with the development of heavy industry, air pollution from sources at each stage of the production process, nitrous oxide and sulfur dioxide emitted from transportation sources, and heavy metal particulates, have steadily increased. The widespread expansion of pollution has become an issue of serious concern to society, and various regulations have been proposed to prevent pollution, including preventing the generation of toxic materials as well as the strengthening of emissions standards. These approaches, however, cannot be considered adequate, and there are a growing number of people who suffer from lung cancer and other cancers as well as an increase in the number of people suffering from asthma. Air purifiers have become a common and indispensable part of life and are to be found installed in homes and sickrooms to prevent and/or treat these illnesses, and are used as prevention or treatment devices in the production stages of sanitary pharmaceuticals, foods, devices, and are also employed in the production of precision machinery.

A variety of devices have been suggested to cleanse the air by removing airborne toxic materials. Among those are air purifiers that use filter materials in air flow passageways to physically collect the dust, or electrical air purification devices such as dust removers that make use of static electricity or infrared rays to disinfect the air, or a combination of any of these approaches in order to remove toxic materials.

Among these, suggestions for conventional devices based on the aforementioned use of static electricity are known, including, for example, (a) an approach utilizing centrifugal force designed such that air, induced from an air inlet, passes through an ionization element while electrical voltage is applied to the inner and outer cylinders while the inner cylinder rotates, moving the air between the inner and outer cylinders, and (b) an approach where, in the above configuration, the outer circumference of an inner cylinder has inclined guide vanes provided in the axial direction along the outer circumference of the inner cylinder and rotational movement is applied to the air as it passes through between the inner and outer cylinders to make use of centrifugal force.

The above mentioned approaches have attempted combined dust collection by the use of electrostatic migration and centrifugal force, however, because high voltages with 11 KV in between the inner and outer cylinders, and as a result of rotating the induced air, a rectified electricity may be generated due to frictional resistance depending upon the air flow rate, and electric discharge sparks may occur between the dust particles that have collected onto the external cylinder, frequently causing risk of electrocution as well as the increased production of ozone and possible malfunction of the device.

In view of the above, research conducted by the inventors of the present application have overcome and eliminated the well known defects described above, and have perfected a device that is superior in terms of safety and that markedly increases the efficiency with which dust is adsorbed. The invention comprises a fan motor; an inner cylindrical electrode that has a

built-in high-voltage transformer, and that is connected to the positive side; a high voltage cap connected to the negative side; an external cylindrical electrode that is earthed; and a housing that has openings on both sides, and that is supported by a pedestal. On occasion that airborne dust that is guided into the unit through the upper inlet passes through an ionization section high-voltage cap that is connected on the negative side, a positive charge is applied to the dust, and it is guided into the electrostatic field between the grounded outer cylindrical electrode and the positive inner cylindrical electrode, and as a result of the electrostatic induction effect, airborne dust passing through is adsorbed onto the surface of the outer cylindrical electrode. Thus, the present invention is characterized by having opposing electrodes that have a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed curved surfaces on the inner cylinder and an outer cylinder provided with a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed surfaces, wherein the convex curved surfaces or recessed surfaces of the inner cylinder and the convex surfaces or recessed surfaces of the outer cylinder alternate with each other. By creating an electrostatic field between these opposing cylinders, the direction of the flow of air passing through them can be alternated, and the flow passageway cross section can be altered so that the flow rate fluctuates, thereby creating a flow separation phenomenon. This causes the generation of a stagnant flow, a reverse flow, or a turbulent flow of air that contains dust. The intention here is to extend the duration of the effect of the electrostatic adsorption on the outer cylindrical electrode surface and to increase in the efficiency of dust removal. The next object of this invention is to provide a device with superior safety. Additionally, an object of the invention is to provide a simple and compact mechanism that can be made available at low cost and that can be placed easily in a variety of locations, as well as to provide a device that allows simple, easy, and safe cleaning of the panel upon which the dust has been adsorbed. Other objects and characteristics of the present invention can be understood from the following explanation.

In Figs. 1 through 5, a housing acceptor cylinder (5) is supported on a stand (1) by means of a shaft (2) upon which a support board (4) consisting of insulating material and provided with exhaust windows (3); an external cylinder accepting cylinder (7) is mounted on the edge of the lower opening section of said housing; an exhaust windows (6') is arranged in the external cylinder barrel (7); and a fan motor (8) is internally installed in a motor cap (9). The fan motor (8) (for practical purposes, preferably with a maximum torque of $1040 \pm 10\%$) is connected to a power source, and the motor cap (9) has a built-in high-voltage transformer (11) that is connected to a power source. An inner tube electrode (14) made of metal and provided with stepwise alternating vertical curved surfaces (12) and convex curved surfaces (13) is installed onto the positive side of the high-voltage transformer, and a rounded-head inner cap (16) made of insulating material and continuing the multiple outer cylinder support [illegible] (15), (15) is mounted in the top opening of this inner cylindrical electrode (14). A metallic high voltage cap (18) that is provided with a limit switch (17) is installed in this cap (16) and connected to the negative side of the high-voltage transformer and a metallic outer cylindrical electrode (22) provided with stepwise alternating vertical curved surfaces (20) and recessed curved surfaces (21) on the upper opening edge step section (19) of the outer cylinder acceptor (7). The vertical arced surfaces (20) and the recessed arced surfaces (21) are positioned so as to face the swelling arced surfaces (12) on the inner cylindrical electrode (14) and the vertical arced surfaces (12) on the inner cylindrical electrode (14) with each other, respectively. The external cylindrical electrode (22) faces the inner cylindrical electrode (14). According to FIG. 1, an air inlet window (23) is arranged in the upper opening of the external cylindrical electrode (22), and a retainer plate (25) made of insulating material is provided on the bottom limit switch retainer element (24). Next,

the housing (27) is installed on the upper opening of the outer perimeter section (26) of the housing acceptor cylinder (5), which is installed on the support board (4). A head section retaining cylinder (28) is installed at the top section of this opening, and an air inlet window (29) is provided in this upper opening and a connector board (31) made of insulating material and provided with dust-proof mesh/screen (30) that is connected by means of bolts (32) to the retainer plate (25), air inlet windows (29), and air inlet windows (23), and is configured so that air passes between the inner and outer electrodes, the exhaust windows (6), and the exhaust windows (3), and is circulated to the outside when the fan motor (8) is operating.

At this time, when the high voltage transformer (11) and power source are connected by a switch, which is separately arranged (in practical terms, an input voltage of 100 V AC and output voltage of 7 KV DC are preferable) the airborne dust that is introduced [into the unit] is positively charged in the vicinity of the transformer (11), by the inner cylindrical electrode (14) that has been connected to the positive side by means of the electrostatic induction between the inner and outer electrodes, and is migrated to the external cylindrical electrodes (22) and clung to its walls.

Here, the direction of the air flow that is passing through the convex curved surfaces (12) and vertical curved surfaces (13) provided on the inner cylindrical electrode (14) is switched by the vertical curved surfaces (20) and recessed curved surfaces (21) provided on the outer cylindrical electrodes (22), and as a result of the change in the cross section layer between these electrodes, the spacing between the vertical curved surfaces (12), (20) of both electrodes should be approximately 20 mm; the spacing between the vertical curved surfaces (21) on the outer cylindrical electrodes (22) and the convex surfaces (13) on the inner cylindrical electrodes (14) should be approximately 16 mm; and the spacing between the recessed curved surfaces (21) on the outer cylindrical electrodes (22) and the vertical curved surfaces (12) on the inner cylindrical electrode (14) should be approximately 25 mm, for practical purposes. The recessed curved surfaces (21) should be 5 mm in diameter, while the convex curved surfaces (13) should be 4 mm in diameter. There is a change in flow rate, and the separation phenomenon is augmented. As a result, the dust-bearing air flow stagnates, reverses or becomes turbulent, thereby extending the duration for electrostatic adsorption and increasing dust collection efficiency (Fig. 6).

In the cross sectional configuration of the above mentioned both electrodes described above, in another embodiment, the convex curved surfaces (13) of the inner cylindrical electrodes (14) could have a gentle linear flow [illegible] convex curved surfaces (13) on the upstream side to intensify the switching of the direction of flow and the change in the flow passageway cross section, making it that much easier for the separation phenomenon to occur, forming lead (33) between the convex curved surfaces (13), (13) for a configuration that augments electrostatic induction. (Fig. 7)

Moreover, as a separate embodiment, convex curved surfaces (34) with gentle flow lines are formed on the upstream side of the outer cylindrical electrodes (22), and both flow line convex curved surfaces (34) and flow line convex curved surfaces (35) are positioned so they oppose one another, thereby intensifying the switching of the direction of flow and the change in the flow passageway cross section, extending the duration in which adsorption occurs due to stagnation, reverse flow, and turbulent flow of the dust-containing air (Fig. 8).

With regard to removal of dust clung onto the surfaces of the outer cylindrical electrodes, the power to electrode (22) is removed along with the retainer plate (25) by removing the connector board (31) and by pulling up and removing the head section retaining cylinder (28) and the housing (27), and after cleaning these, it is easy to restore them to their original state and join together. At this time, the retainer element (24) of the retainer plate (25) is separated from the limit switch

(17), thereby breaking off the flow of current between the high-voltage transformer (11) and the power source, so that there is no risk of electrocution.

As configured above, the present invention extends the duration of the cling effect on the outer cylindrical electrode by means of electrostatic induction of the dust-carrying air that passes between the electrodes, thereby increasing the efficiency of dust removal and reducing mold spores and yeast fungus.

Moreover, this is a particularly safe device since there is no danger that frictional force and resulting rectified electricity will be generated as a result of centrifugal force as the air passes through the unit, and the risk of malfunction due to sparking electric discharge between the adsorbed dust particles resulting in electrocution or explosion can be prevented, and the generation of ozone can be suppressed.

Also, given the device's simple and compact configuration, it can be manufactured less expensively, and it is also easy to move.


4. Brief Description of the Drawings

Figure 1 is a front view. Figure 2 is a plan view. Figure 3 is a view of the bottom surface. Figure 4 is a cross-sectional view along the A-A line in Figure 1. Figure 5 is a cross-sectional view along the B-B line in Figure 1. Figure 6 is an enlarged view of the area indicated by the letter E in Figure 4. Figure 7 is an enlarged flow line cross section diagram of another embodiment. Figure 8 is an enlarged flow line cross section diagram of yet another embodiment.

Applicant: Kyowa Seiko, Ltd.

Agent: Hiraki MIURA [seal]

4



翳

⑬ 日本国特許庁

公開特許公報

縣長 許長百 科 正 天 地 股

1. 發明之名稱 改良之新式電燈
2. 知照者 凡欲購用者請向本局或各代售處洽詢
3. 特許應辦人 王正廷
4. 代理人 丁

①特開昭 51-90077

⑬公開日 昭51. (1976) 8. 6

④特版略 FD-16080

②出願日 昭50.(1975).2.6

審查請求 有 (全5頁)

厅内整理番号

7000 f1

⑤日本分類

72 CF4

⑤ Int. C12

BOJC 3/4P

送付書類の日版			
(1) 明 通 譯	1	通	
(2) 陶 函	1	通	
(3) 風雲集本	1	通	
(4) 齊任扶	1	通	
齊任扶	1	通	

50 816060

2、 猪嘴口名称 空似欲破洞并裂破

3、特許請求の範囲

五、電報を以てられたる條の人人にんそ。列
國する電報網を通じてあるうにした空は無線電
波にかいて、上記列國する電報網を通じて空は
心與ふべきを以てなせ。本口無線の所而して電化
言せることによつて、列國電報を以てせざるに空
は電報網を以てするよりしたことを等閑とする空
は電報網を以て。

3. 说明的詳細な説明

工場の機務は、空気を調節する機械に關し、空気のふんじんを等速流により吸着せしめる装置を備へて、その抽吸効率を上げることである。乾燥に關し、よく乾燥して一層原料を吸着の都合からなり、同年の工務とより高い生産性を以て生産された。かつ貴女族に於て、より高い使用材料を得ることである。乾燥装置の構造を得る上とするものである。

近頃實工場の増大に伴い、各種改良設備に力

[illegible]

そこで、江流中の荷重係数を除去して新設の
大母の強度を算出される。そのいくつかは江流
の過渡域にかいて存在し、またあるものは江流
に到達するものおよび砂質材料層にとり及ぼす影
響せしめるもの又はそれを用いながら地盤を固める
や他の目的に向つて化する間接その上に記す設備の

は、花便マシヤ (22) の傍面に於いて主の横に
置かれ、門外開道に於いて主の横に於いて
の横に於いて主の横に (22) に置かれ、
(22) に置かれ、主の横に於いて主の横に

との間、内河電報 (26) に於ける大内河電報 (29) と
西河電報 (31) とが、外河電報 (22) に於ける大内河電
報 (29) と内河電報 (31) とによつて、互換の通過す
る距離の万端が距離を大々短くす。その内河電
報の通過に於ける内河電報の距離は 127.5
(29) の距離は 10.5 光、外河電報 (22) の距離は
(22) と内河電報 (31) の距離は (31) と内河電報
2.4 光、外河電報 (29) の距離は (29) と内河電報
(31) の距離は (31) との距離を 10.5 光とすると
と、同その距離は (22) は 1.4 光、内河電報 (31)
は 1.4 光とすることになり、1 の変化によつ
て距離が短縮し、互換の距離が短縮するの益
と多し。これによつて全電報の互換の効率、互
換の速さは内河電報を短縮させ外河電報の距離が短
縮されるの互換が明せられ内河電報の速さを上げしめる
理由となる。(27.0 光)

わけて同級部員である。この成績表は(28)の所見
部員(29)よりスコット(29)と年齢し、同級
トランシ(29)と年齢との相違を明つので、成績の
考へられ、並びに、

支那の民衆は、上記の状況にあるので、列強國を激怒する含威怒兵を發動することによつて其國を保護し其國の利益を保全するので、その軍隊は、其を撃つべき司令國を以て、其軍隊の数を増やすことを求むる。

又、通達中の足袋は、素心為紙に入つて紙で拭
拭かざる様紙で其の養生の事それ故なく、よつて
履きされた上んじんと同に火氣成るに始する
事故にしては履紙紙の履きを承知に中止すること
が可也。又オソンの例を模倣することもて其の
質を改良され火氣成である。

さらに機軸が薄板小形であるので肉厚を工面と
より大いに変更を以て生産されかつ容易である。

七、總的說明

第 1 组为正视图、第 2 组为平面图、第 3 组为侧

[illegible]

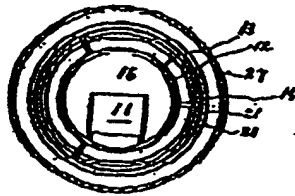
その積、右にフランス (32) の費用の比は、入力
係数入、0.1007、出力係数0.00155
、可換と見做し、)と結果とを別に表したスイザ
に上より求めれば、得入は九千五百万のふんじん

[illegible]

うちには、別の英通所として、武陽電報(22)に
 一上河州に於いて設立する電報局(23)を設け、
 武陽電報に下河州に於いて設立する電報局(24)
 (25)を設け、西陵電報に河州(26)を相互に
 接続せしめて内通させ、武陽の方内河州、武陽
 河州の文化をより進めさせ、立憲政治の発展、道
 徳、新報紙に上る教育作用の増進をより進めし
 ることである。(第4巻)

定に、外國を訪問し、報告された本館じんの缺失
に因つては、新聞紙の故(20)を尋ねし、新聞作
品(21)をよび、(22)を引上げ、(23)を引上げ、
し、(24)をよび、(25)をよび、(26)をよび、
し、(27)をよび、(28)をよび、(29)をよび、
し、(30)をよび、(31)をよび、(32)をよび、
し、(33)をよび、(34)をよび、(35)をよび、
し、(36)をよび、(37)をよび、(38)をよび、
し、(39)をよび、(40)をよび、(41)をよび、
し、(42)をよび、(43)をよび、(44)をよび、
し、(45)をよび、(46)をよび、(47)をよび、
し、(48)をよび、(49)をよび、(50)をよび、
し、(51)をよび、(52)をよび、(53)をよび、
し、(54)をよび、(55)をよび、(56)をよび、
し、(57)をよび、(58)をよび、(59)をよび、
し、(60)をよび、(61)をよび、(62)をよび、
し、(63)をよび、(64)をよび、(65)をよび、
し、(66)をよび、(67)をよび、(68)をよび、
し、(69)をよび、(70)をよび、(71)をよび、
し、(72)をよび、(73)をよび、(74)をよび、
し、(75)をよび、(76)をよび、(77)をよび、
し、(78)をよび、(79)をよび、(80)をよび、
し、(81)をよび、(82)をよび、(83)をよび、
し、(84)をよび、(85)をよび、(86)をよび、
し、(87)をよび、(88)をよび、(89)をよび、
し、(90)をよび、(91)をよび、(92)をよび、
し、(93)をよび、(94)をよび、(95)をよび、
し、(96)をよび、(97)をよび、(98)をよび、
し、(99)をよび、(100)をよび、(101)をよび、
し、(102)をよび、(103)をよび、(104)をよび、
し、(105)をよび、(106)をよび、(107)をよび、
し、(108)をよび、(109)をよび、(110)をよび、
し、(111)をよび、(112)をよび、(113)をよび、
し、(114)をよび、(115)をよび、(116)をよび、
し、(117)をよび、(118)をよび、(119)をよび、
し、(120)をよび、(121)をよび、(122)をよび、
し、(123)をよび、(124)をよび、(125)をよび、
し、(126)をよび、(127)をよび、(128)をよび、
し、(129)をよび、(130)をよび、(131)をよび、
し、(132)をよび、(133)をよび、(134)をよび、
し、(135)をよび、(136)をよび、(137)をよび、
し、(138)をよび、(139)をよび、(140)をよび、
し、(141)をよび、(142)をよび、(143)をよび、
し、(144)をよび、(145)をよび、(146)をよび、
し、(147)をよび、(148)をよび、(149)をよび、
し、(150)をよび、(151)をよび、(152)をよび、
し、(153)をよび、(154)をよび、(155)をよび、
し、(156)をよび、(157)をよび、(158)をよび、
し、(159)をよび、(160)をよび、(161)をよび、
し、(162)をよび、(163)をよび、(164)をよび、
し、(165)をよび、(166)をよび、(167)をよび、
し、(168)をよび、(169)をよび、(170)をよび、
し、(171)をよび、(172)をよび、(173)をよび、
し、(174)をよび、(175)をよび、(176)をよび、
し、(177)をよび、(178)をよび、(179)をよび、
し、(180)をよび、(181)をよび、(182)をよび、
し、(183)をよび、(184)をよび、(185)をよび、
し、(186)をよび、(187)をよび、(188)をよび、
し、(189)をよび、(190)をよび、(191)をよび、
し、(192)をよび、(193)をよび、(194)をよび、
し、(195)をよび、(196)をよび、(197)をよび、
し、(198)をよび、(199)をよび、(200)をよび、
し、(201)をよび、(202)をよび、(203)をよび、
し、(204)をよび、(205)をよび、(206)をよび、
し、(207)をよび、(208)をよび、(209)をよび、
し、(210)をよび、(211)をよび、(212)をよび、
し、(213)をよび、(214)をよび、(215)をよび、
し、(216)をよび、(217)をよび、(218)をよび、
し、(219)をよび、(220)をよび、(221)をよび、
し、(222)をよび、(223)をよび、(224)をよび、
し、(225)をよび、(226)をよび、(227)をよび、
し、(228)をよび、(229)をよび、(230)をよび、
し、(231)をよび、(232)をよび、(233)をよび、
し、(234)をよび、(235)をよび、(236)をよび、
し、(237)をよび、(238)をよび、(239)をよび、
し、(240)をよび、(241)をよび、(242)をよび、
し、(243)をよび、(244)をよび、(245)をよび、
し、(246)をよび、(247)をよび、(248)をよび、
し、(249)をよび、(250)をよび、(251)をよび、
し、(252)をよび、(253)をよび、(254)をよび、
し、(255)をよび、(256)をよび、(257)をよび、
し、(258)をよび、(259)をよび、(260)をよび、
し、(261)をよび、(262)をよび、(263)をよび、
し、(264)をよび、(265)をよび、(266)をよび、
し、(267)をよび、(268)をよび、(269)をよび、
し、(270)をよび、(271)をよび、(272)をよび、
し、(273)をよび、(274)をよび、(275)をよび、
し、(276)をよび、(277)をよび、(278)をよび、
し、(279)をよび、(280)をよび、(281)をよび、
し、(282)をよび、(283)をよび、(284)をよび、
し、(285)をよび、(286)をよび、(287)をよび、
し、(288)をよび、(289)をよび、(290)をよび、
し、(291)をよび、(292)をよび、(293)をよび、
し、(294)をよび、(295)をよび、(296)をよび、
し、(297)をよび、(298)をよび、(299)をよび、
し、(300)をよび、(301)をよび、(302)をよび、
し、(303)をよび、(304)をよび、(305)をよび、
し、(306)をよび、(307)をよび、(308)をよび、
し、(309)をよび、(310)をよび、(311)をよび、
し、(312)をよび、(313)をよび、(314)をよび、
し、(315)をよび、(316)をよび、(317)をよび、
し、(318)をよび、(319)をよび、(320)をよび、
し、(321)をよび、(322)をよび、(323)をよび、
し、(324)をよび、(325)をよび、(326)をよび、
し、(327)をよび、(328)をよび、(329)をよび、
し、(330)をよび、(331)をよび、(332)をよび、
し、(333)をよび、(334)をよび、(335)をよび、
し、(336)をよび、(337)をよび、(338)をよび、
し、(339)をよび、(340)をよび、(341)をよび、
し、(342)をよび、(343)をよび、(344)をよび、
し、(345)をよび、(346)をよび、(347)をよび、
し、(348)をよび、(349)をよび、(350)をよび、
し、(351)をよび、(352)をよび、(353)をよび、
し、(354)をよび、(355)をよび、(356)をよび、
し、(357)をよび、(358)をよび、(359)をよび、
し、(360)をよび、(361)をよび、(362)をよび、
し、(363)をよび、(364)をよび、(365)をよび、
し、(366)をよび、(367)をよび、(368)をよび、
し、(369)をよび、(370)をよび、(371)をよび、
し、(372)をよび、(373)をよび、(374)をよび、
し、(375)をよび、(376)をよび、(377)をよび、
し、(378)をよび、(379)をよび、(380)をよび、
し、(381)をよび、(382)をよび、(383)をよび、
し、(384)をよび、(385)をよび、(386)をよび、
し、(387)をよび、(388)をよび、(389)をよび、
し、(390)をよび、(391)をよび、(392)をよび、
し、(393)をよび、(394)をよび、(395)をよび、
し、(396)をよび、(397)をよび、(398)をよび、
し、(399)をよび、(400)をよび、(401)をよび、
し、(402)をよび、(403)をよび、(404)をよび、
し、(405)をよび、(406)をよび、(407)をよび、
し、(40

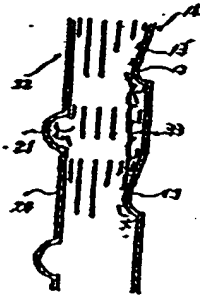
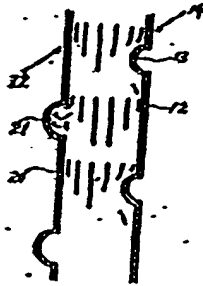
第 5 圖



第 6 圖

第 7 圖

第 8 圖



THIS PAGE BLANK (USPTO)

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

THIS PAGE BLANK (USPTO)